

AMENDMENTS TO THE CLAIMS

1. (Original) An illumination source comprising:
 - a first monochromatic illumination source comprising an associated illumination center-wavelength and associated illumination tolerance, wherein the source emits rays defining an illumination path; and
 - a bandpass filter positioned in the illumination path, wherein the filter comprises an associated filter center-wavelength and an associated filter tolerance, and wherein
 - the filter tolerance is no greater than approximately one-half the illumination tolerance and
 - the filter center-wavelength is approximately within a range from about the illumination center-wavelength minus the illumination tolerance to about the illumination center-wavelength plus the illumination tolerance.
2. (Original) The illumination source of claim 1, wherein:
 - the monochromatic illumination source is an LED;
 - the illumination center-wavelength is approximately 700nm; and
 - the illumination tolerance is no greater than about 20nm.
3. (Original) The illumination source of claim 2, comprising:
 - a second illumination source emitting rays defining another illumination path reflecting off of the filter in a first direction, wherein the first illumination source and second illumination source are arranged relative to the filter such that rays from the first illumination source pass through the filter in the first direction, whereby the first and second illumination sources provide coaxial illumination.
4. (Original) The illumination source of claim 3, wherein the second illumination source is an LED comprising an associated center-wavelength of approximately 940nm.

5. (Original) The illumination source of claim 3, wherein the illumination path associated with the second illumination source is positioned roughly 90 degrees relative to the illumination path associated with the first illumination source.

6. (Previously Presented) The illumination source of claim 1, comprising a second illumination source emitting rays defining another illumination path reflecting off of the filter in a first direction, wherein:

the first illumination source is an LED having an associated illumination center-wavelength approximately within a range from about 680nm to about 960nm;

the second illumination source is an LED comprising an associated illumination center-wavelength approximately within a range from about 510nm to 740nm; and

the first illumination source and the second illumination source are arranged relative to the filter such that rays from the first illumination source pass through the filter in the first direction.

7. (Original) The illumination source of claim 6, wherein:

the illumination center-wavelength associated with the first illumination source is approximately within a range from about 700nm to about 740nm; and

the illumination center-wavelength associated with the second illumination source is approximately within a range from about 510nm to about 550nm.

8. (Original) The illumination source of claim 7, wherein the illumination tolerance is not greater than about 20nm

9. (Previously Presented) A readhead comprising:

a first LED having a first center-wavelength associated therewith and being adapted to emit a first path of light;

a second LED having a second center-wavelength associated therewith and being adapted to emit a second path of light intersecting the first path of light at an intersection;

a beam splitter positioned at the intersection and having a bandpass filter associated therewith, wherein:

the first LED, the second LED and the beam splitter are arranged to provide coaxial illumination in a first direction,

the bandpass filter comprises a relatively narrow bandpass compared to a bandwidth associated with the first LED,

at least a portion of the coaxial illumination is reflected off a sample creating diffuse reflected light; and

the readhead further comprises a detector located to receive at least a portion of the diffuse reflected light.

10. (Original) The readhead of claim 9, wherein:
the bandwidth associated with the first LED is approximately 100nm; and
the narrow bandpass is approximately 25nm.

11. (Original) The readhead of claim 9, wherein the first and second LEDs have associated tolerances not greater than 20nm and the bandpass filter has an associated tolerance of not greater than 10nm.

12. (Previously Presented) The readhead of claim 9, comprising a light-scattering section upstream of the detector, wherein the light-scattering section comprises a plurality of steps formed at predefined angles greater than 90 degrees.

13. (Original) The readhead of claim 12, wherein the predefined angles at which the steps are formed are not less than approximately 100 degrees.

14. (Previously Presented) A readhead adapted for use in a monitoring system adapted to receive a sample on a sample aperture and determine a parameter value based on analyzing the sample, the readhead comprising:

a first LED having a first center-wavelength and a first tolerance associated therewith and being adapted to emit a first path of light;

a beam splitter comprising a bandpass filter positioned in the first path of light and having a filter center-wavelength and a filter tolerance associated therewith;

a second LED positioned relative to the first LED and the beam splitter and having a second center-wavelength and a second tolerance associated therewith and being adapted to emit a second path of light intersecting the beam splitter, wherein:

the second LED, the beam splitter and first LED are positioned to provide coaxial illumination of the sample by the first and second LEDs,

the filter tolerance is less than the first tolerance,

the bandpass filter comprises a relatively narrow bandpass compared to a bandwidth associated with the first LED; and

the readhead further comprises:

a face defining an exit aperture through which the coaxial illumination passes, wherein the sample aperture is spaced a predetermined distance from the face and positioned to be illuminated by the coaxial illumination, such that when the sample is located on the sample aperture, the sample will reflect at least a portion of the coaxial illumination; and

a detector adapted to detect diffuse light resulting from the reflected illumination.

15. (Original) The readhead of claim 14, wherein the filter tolerance is less than the second tolerance.

16. (Original) The readhead of claim 14, wherein the bandwidth of the first LED is approximately 100nm and the filter bandpass is approximately 25nm.

17. (Original) The readhead of claim 14, wherein at least light from the first LED is filtered by the filter.

18. (Original) The readhead of claim 15, wherein light from the second LED is reflected off the filter to provide the coaxial illumination with light from the first LED passing through the filter.

19. (Original) The readhead of claim 14, wherein the second center wavelength is higher than the filter center-wavelength and the first center-wavelength.

20. (Original) The readhead of claim 19, wherein the filter tolerance is less than the second tolerance.

21. (Original) The readhead of claim 20, wherein the filter tolerance is not greater than about 10nm.

22. (Original) The readhead of claim 21, wherein the first center-wavelength is about 700nm and the second center-wavelength is about 940nm.

23. (Original) The readhead of claim 14, comprising a light-scattering section associated with the detector, wherein the light-scattering section comprises a plurality of steps defining one or more angles greater than 90 degrees and positioned to reduce internal stray light reaching an active area of the detector.

24. (Currently Amended) A readhead adapted for use in a monitoring system adapted to receive a sample on a sample aperture and determine a parameter value based on analyzing the sample, the readhead comprising:

a first LED having a first center-wavelength associated therewith and being adapted to emit a first path of light, the first LED having associated therewith a first bandwidth and a first tolerance;

a beam splitter positioned in the first path of light, the beam splitter comprising a filter;

a second LED positioned relative to the first LED and the beam splitter and having a second center-wavelength associated therewith and being adapted to emit a second path of light intersecting the beam splitter, the second LED having associated therewith a second bandwidth and a second tolerance, the second center-wavelength being greater than the first center-wavelength, wherein

the filter has associated therewith a filter bandpass being relatively narrow compared to the first bandwidth and the second bandwidth,

the first and second paths of light interact with the beam splitter forming a beam of illumination comprising light from the first LED and the second LED; and the readhead further comprises

a face defining an exit aperture through which the beam passes, wherein the sample aperture is spaced from the face and positioned to be illuminated by the beam such that when the sample is located on the sample aperture, the sample will reflect at least a portion of the beam;

a detector comprising an active area and a detection aperture positioned to receive at least a portion of diffuse light resulting from the reflected beam; and

a light-scattering section positioned upstream of the detector active area, wherein the light-scattering section comprises a plurality of steps defining one or more angles greater than 90 degrees and the section is positioned such that the steps are angled to reduce stray internal light on the detector active area.

25. (Original) The readhead of claim 24, wherein the one or more angles defined by the plurality of steps are approximately 100 degrees.

Claim 26 (Cancelled)

27. (Currently Amended) The readhead of claim ~~[[26]]~~25, wherein:

~~the beam splitter comprises a bandpass filter having~~has a filter center-wavelength and a filter tolerance associated therewith; and

the filter center-wavelength and filter tolerance are selected to separate wavelengths associated with the first LED from wavelengths associated with second LED such that the light in

the beam from the first LED does not have wavelengths equal to wavelengths of light in the beam from the second LED.

Claim 28 (Cancelled)

29. (Currently Amended) The readhead of claim ~~[[28]]~~25, wherein the filter has associated therewith a filter center-wavelength less than approximately the second center-wavelength plus the second tolerance.

30. (Original) The readhead of claim 29, wherein the filter center-wavelength is less than approximately the first center-wavelength plus the first tolerance.

31. (Original) The readhead of claim 30, wherein the filter center-wavelength is less than approximately the first center-wavelength minus the first tolerance.

32. (Original) The readhead of claim 30, wherein the filter center-wavelength is less than approximately the first center-wavelength minus 20nm.

33. (Original) The readhead of claim 32, wherein the filter has associated therewith a tolerance less than approximately 20nm.